HALPRIN, TEMPLE & GOODMAN

1301 K STREET N.W.
SUITE 1020, EAST TOWER
WASHINGTON, D.C. 20005

(202) 371-9100
TELEFAX: (202) 371-1497

ALBERT HALPRIN
RILEY K. TEMPLE
STEPHEN L. GOODMAN

MELANIE HARATUNIAN
JOEL BERNSTEIN
JANICE OBUCHOWSKI, OF COUNSEL

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December 3, 1993

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Re: Ex Parte Meeting, CC Docket No. 92-297

Dear Mr. Caton:

On today's date, the undersigned, along with Mr. Don Franco, Mr. Walter Sonnenfeldt and Mr. Doug Locke, as representatives of Video/Phone Systems, met with Mr. Tom Tycz, Mr. Harry Ng, Mr. Robert James and Ms. Susan Magnotti of the Common Carrier Bureau to discuss the ability of terrestrial LMDS to share with satellite systems in the 28 GHz band. Video/Phone explained how sharing could occur with reasonable operational compromises made by both terrestrial and satellite systems. Those operating constraints could take the form of off-axis power density limits, possibly achieved by use of advanced antenna shrouding techniques.

The enclosed charts summarize the issues that were discussed. Video/Phone also indicated that it would discuss these issues with the satellite entities directly. Please contact me if you have any questions.

Sincerely,

Stephen L. Goodman

Enclosure
cc: Mr. Harry Ng
Mr. Robert James
Ms. Susan Magnotti

Video/Phone Systems, Inc.
Endgate Technology Corporation

Factors Affecting Feasibility of LMDS/FSS Co-Primary Sharing

December 3, 1993

LMDS Allocation Overview

- By NPRM in Docket No. 92-297, FCC proposes to Re-Designate 27.5 - 29.5 GHz for LMDS
- LMDS will operate on a Co-Primary basis with existing FSS allocation
- LMDS will make possible Broadband "Wireless Fiber" service
  - → Interactive Multi-Channel Cable Television
  - → High Speed Data
  - → Voice Telephony

Co-Primary Sharing Overview

- Video/Phone supports co-primary sharing in NPRM Comments
- Others dispute feasibility of co-primary sharing based on early LMDS system designs
- Recent technological advances make co-primary sharing feasible
- Video/Phone has commenced informal discussions with satellite parties that could lead to a productive resolution

LMDS/FSS Co-Primary Sharing

- 28 GHz propagation characteristics are conducive to co-primary sharing

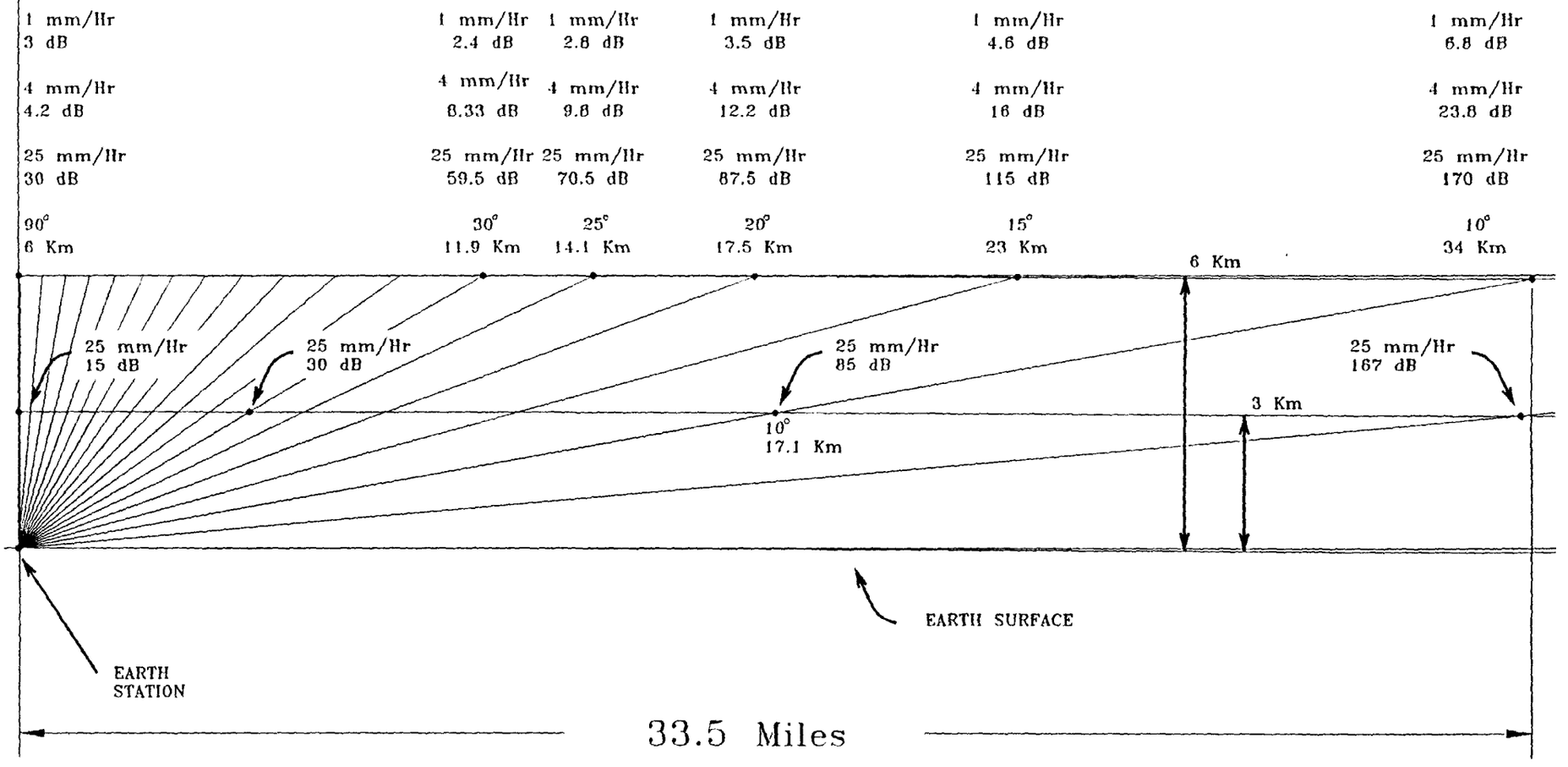
- Potential interference paths

  → LMDS Tx into GEO FSS Space Rx
  → LMDS Tx into LEO FSS Space Rx
  → GEO FSS Uplink Tx into LMDS Rx
    - Hub Rx
    - Customer Rx
  → LEO FSS Uplink into LMDS Rx
    - Hub Rx
    - Customer Rx

Operating Criteria

- Off-axis emission limits for LMDS and FSS Tx operations
  - LMDS Tx sidelobe emissions restricted above 20 degrees elevation angle
  - FSS Tx sidelobe emissions restricted below 20 degrees elevation angle
    - → Rain attenuation considerations make FSS operations below 20 degrees elevation angle a commercial liability

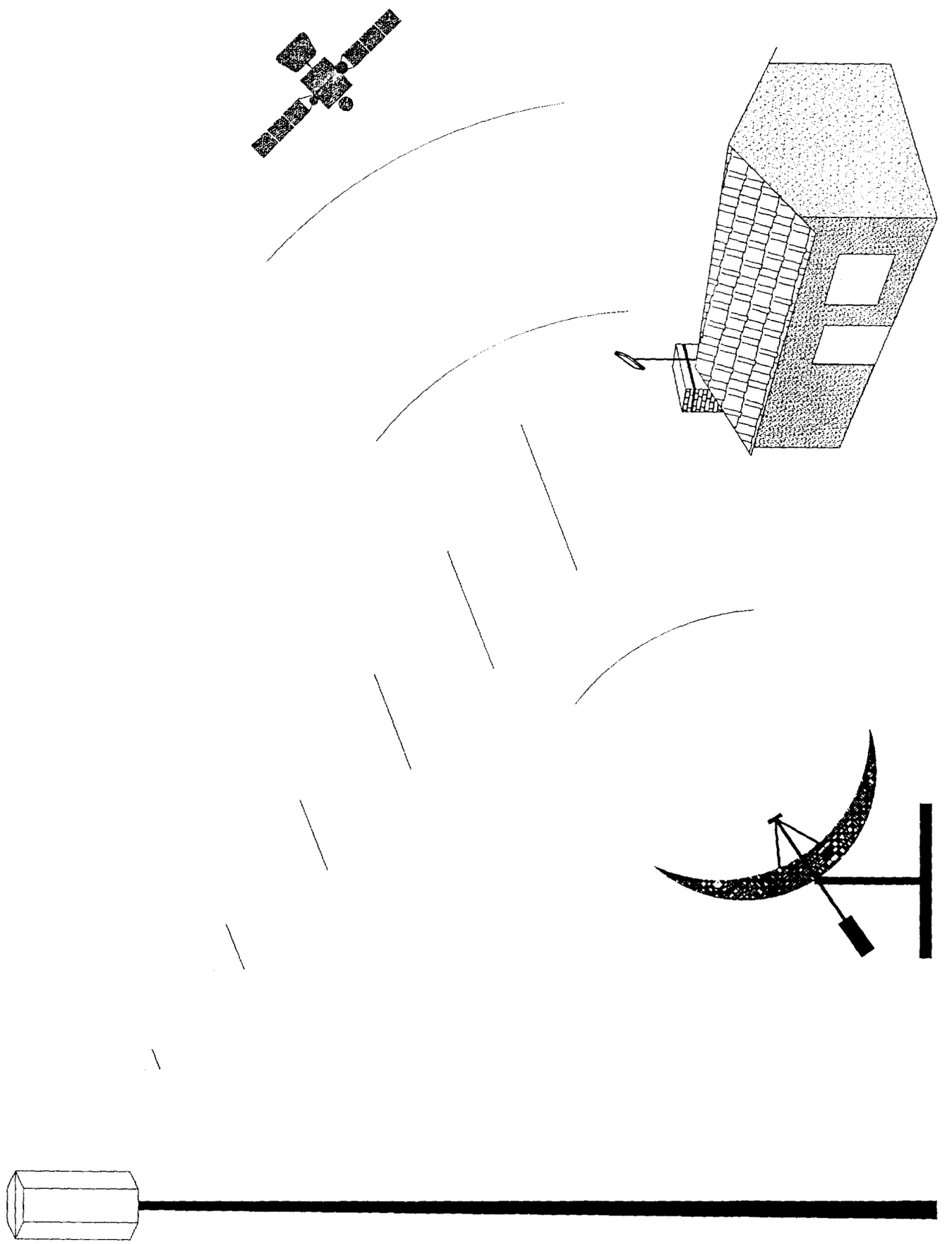
Weather Fade Vs Rain Rate Vs Elevation Angle at 30 GHz

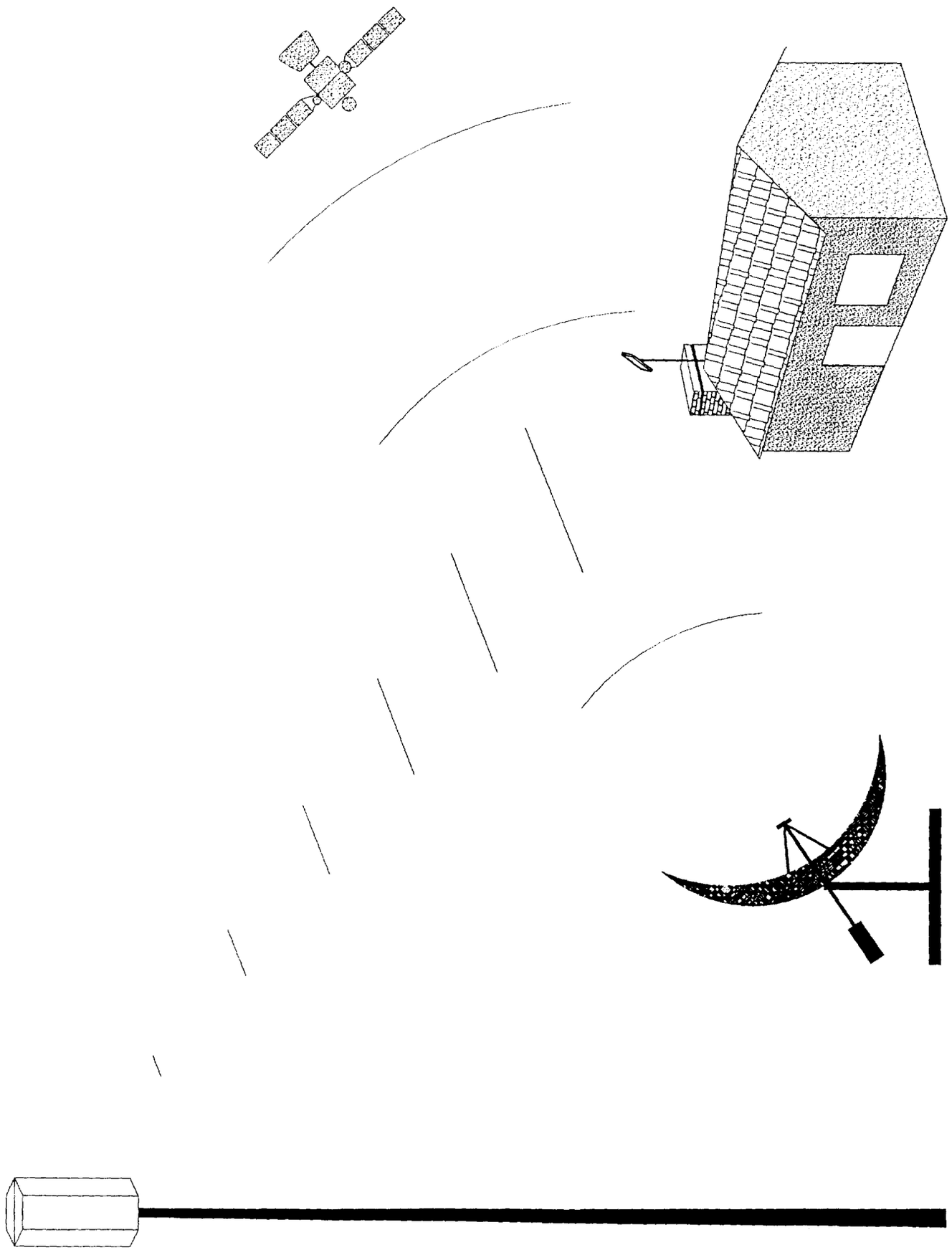


Economic Considerations

- Cost impact can be equitably spread between services

- Cost factors
  - Shrouding
  - Increased Tx power
  - Increased Rx performance
  - Slightly more complex deployment
    - → LMDS
    - → GEO FSS
    - → LEO FSS





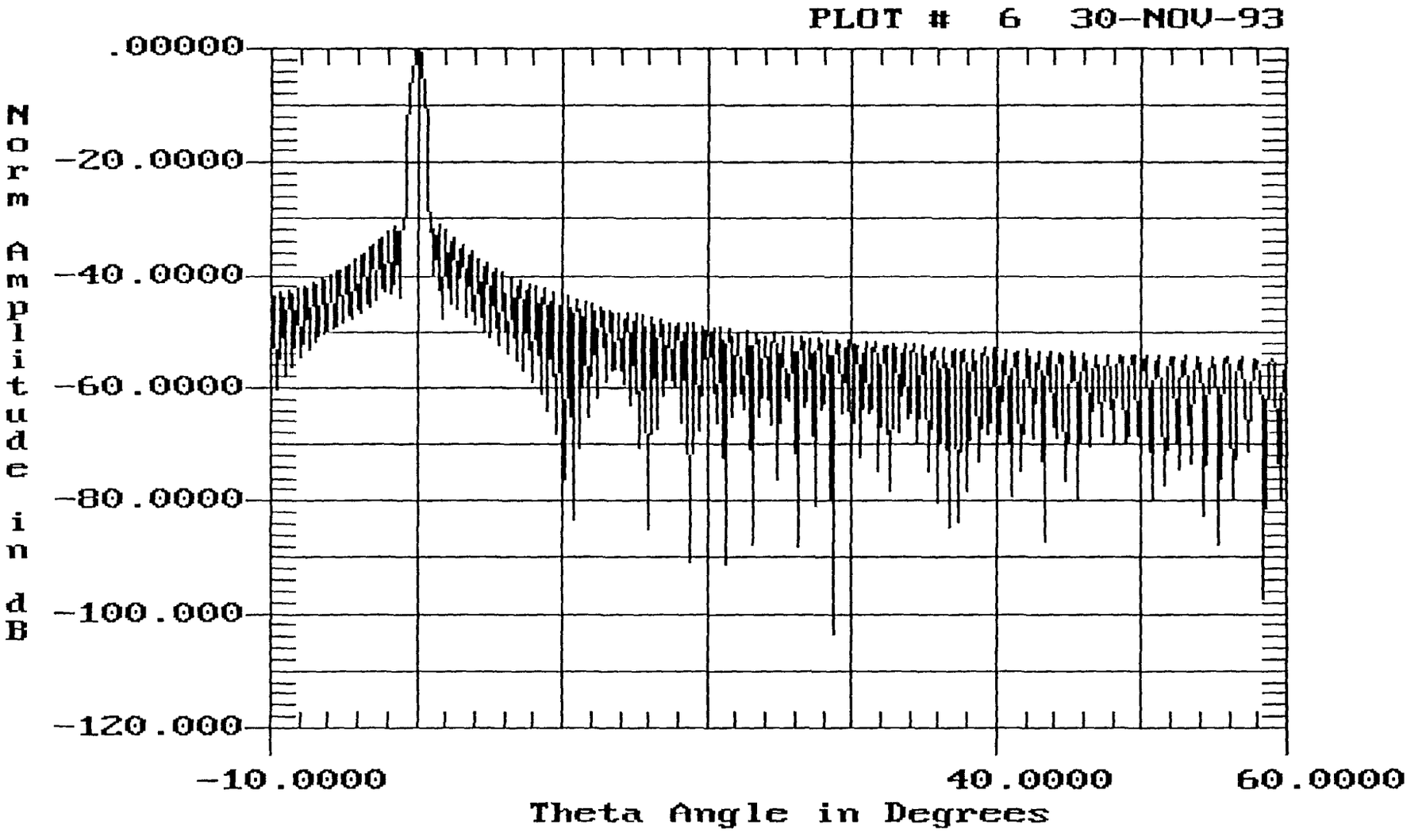
Technical Solutions

- Very low side lobe antennas
- RF absorbing antenna shrouds
- Improved Rx performance
- Advanced error correction techniques
- Active cancellation
- Active emission monitoring and channel assignment

128 el's .331=S d=42.4

≈ 50dB −30dB SLL., $\bar{n}=4$

28.56 Hz



LMDS Operating Rules

- Limit Tx side lobe levels above 20 degrees elevation angle:

FSS Operating Rules

- Limit Tx side lobe levels below 20 degrees elevation angle:

VIDEO/PHONE INTERFERENCE WITH GEOSYNCHRONOUS SATELLITE

SPOT BEAM ON NYC AREA 12-2-93

(REVISED)

ASSUMPTIONS:

TERRESTRIAL

Spot Beam on metropolitan NY area
Spot area on surface = 17,808.7 sq.mi.
No. of cells in spot = 51028 Cell radius = 0.3333 mi.
No. of Sector transmitters @ 36/cell = 1,837,008
Each Sector transmitter serves 40 subscriber transceivers
Bandwidth per transmit channel = 6 MHz or per Sector = 1000 MHz
Only sidelobe radiation is incident upon satellite- except for selected No. of main beams
10% of transmitters are at full power (thru rain) at any one time
90% of transmitters are typically operating at 4.9 dB (rain margin) below full power
Worst case of all signals adding in phase at satellite
Typical case of all signals adding in random phase at satellite

SPACE

Geosynchronous satellite with spot beam
Satellite Antenna Gain = 53 dB
Satellite Beam Width = 0.367 deg.
System Noise Temp. = 920 deg. K

PER SECTOR

Full Transmit Power =	-2.5	dBW
Antenna Gain =	31.3	dB
Max Sector EIRP =	28.8	dBW
RMS Sidelobe Level =	-47.9	dB
Max Pow Sidelobe EIRP	-19.1	dBW
Typical Sidelobe EIRP =	-24.0	dBW
Path Loss =	213.2	dB
Max Rec Power @ Sat =	-232.3	dBW
Power Density @ Sat. =	-322.3	dBW/Hz

PER SUBSCRIBER

Transmit Power =	-31.3	dBW
Antenna Gain =	38.9	dB
Max Subscriber EIRP =	7.6	dBW
RMS Sidelobe Level =	-47.9	dB
Max Pow Sidelobe EIRP	-40.3	dBW
Typical Sidelobe EIRP =	-45.2	dBW
Path Loss =	213	dB
Max Rec Power @ Sat =	-253.3	dBW
Power Density @ Sat.=	-321.0	dBW/Hz

TOTAL POWER DENSITY @ SATELLITE

183701	SECTS @ Max	-216.6	dBW/Hz
1653307	SECTS @ Typ.	-212.0	dBW/Hz
7,348,032	SUBSCRIBERS	-215.4	dBW/Hz
66,132,288	SUBSCRIBERS	-210.8	dBW/Hz
15	MAIN BEAMS	-214.5	dBW/Hz
IN PHASE TOTAL =		**-206.3**	**dBW/Hz**

RMS TOTAL =	**-209.3**	**dBW/Hz**

NOISE POWER DENSITY @ SATELLITE

Satellite Rx Noise Temp. =	920.0	deg. K
Satellite Rx Noise Density =	**-199.0**	**dBW/Hz**
Interference vs Noise	-10.4	dB

SINGLE SECTOR DIRECTLY INCIDENT ON SATELLITE

Transmit Power =	-2.5	dBW
Antenna Gain =	31.3	dB
EIRP =	28.8	dBW
Path Loss =	213.2	dB
Receive Power @ Sat =	-184.4	dBW
Power Density @ Sat. =	**-274.4**	**dBW/Hz**

SUMMARY

- Recent technological advances have made co-primary sharing feasible
- Practical operating limits can be imposed
  - LMDS & FSS deployment slightly more complex
  - Cost can be equitably apportioned
- The Commission should encourage informal industry negotiations aimed at developing sharing rule proposals in order to:
  - Maximize use of limited spectrum resources
  - Expand the use of 28 GHz band in the public interest